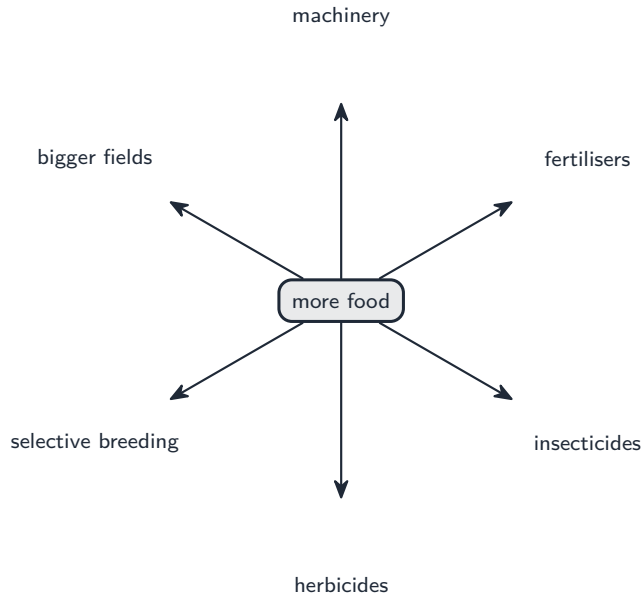


Human influences on ecosystems

IGCSE Biology

Increasing food supply

To grow more food, humans use:



Ways farmers increase food production

- **agricultural machinery** to farm larger areas of land quickly.
- chemical **fertilisers** to improve **yields**.
- **insecticides** to kill insect pests.
- **herbicides** to kill **weeds** that compete with the crops.
- **selective breeding** to improve **crop plants** and **livestock**.

A **monoculture** (growing one crop over a large area) gives a big, easy harvest, but one pest or disease can destroy the whole crop, and it lowers **biodiversity**. Intensive livestock farming (many animals in a small space) gives cheap meat, but raises worries about animal welfare and the spread of disease.

Habitat destruction



Clearing forest destroys habitats and reduces biodiversity.

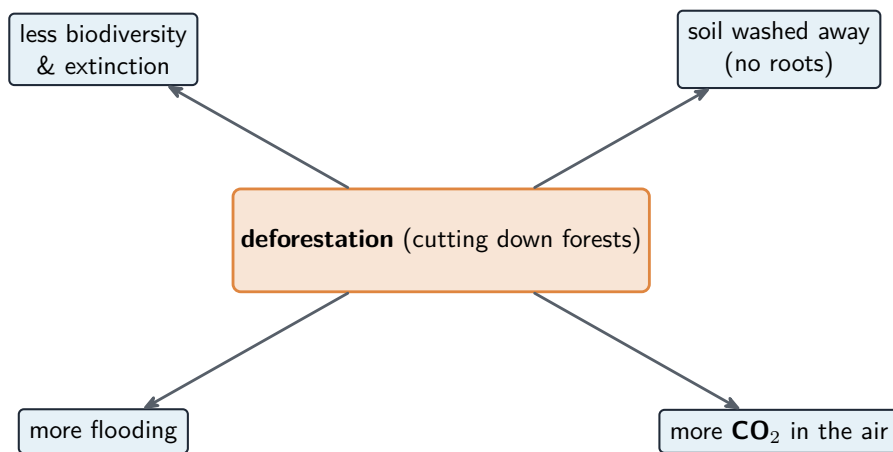
Biodiversity is the number of different **species** living in an area. Humans destroy **habitats** (the places where organisms live) by:

- clearing land for housing, crops and livestock.
- extracting natural **resources**, such as by mining.
- **pollution** of fresh water and the sea.

By changing **food webs** and **food chains**, humans harm habitats.

Deforestation (cutting down forests) is a major example. It causes:

- lower biodiversity and the **extinction** of species.
- loss of soil (no roots to hold it, so it washes away).
- more flooding.
- more **carbon dioxide** in the air, because there are fewer trees to take it in.



Deforestation lowers biodiversity, washes away soil, causes flooding and adds CO₂

Pollution



Plastic pollution is a major human impact on ecosystems.

■ Water pollution

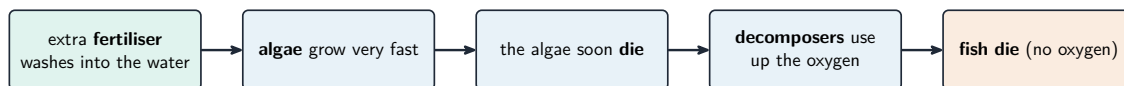
Untreated **sewage** and excess fertiliser washed into rivers and lakes damage water **ecosystems**.

(Supplement) Excess fertiliser causes **eutrophication** :

1. the fertiliser adds **nitrate ions** and other ions to the water.
2. **producers** such as algae grow very fast.
3. they soon die, and **decomposition** increases.

4. **decomposers** use up the **oxygen** in **aerobic respiration**

5. the dissolved oxygen falls, so fish and other organisms die.



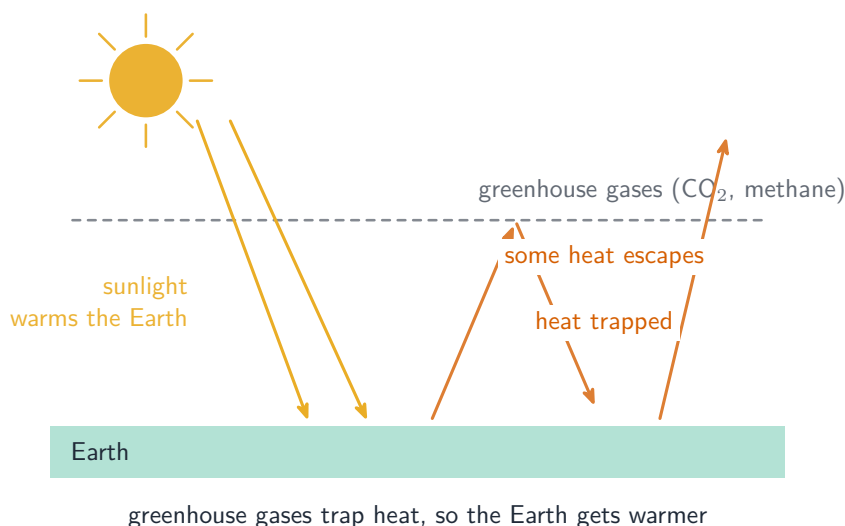
Eutrophication: extra fertiliser makes algae bloom, then the water loses its oxygen and fish die

Worked example. A farmer spreads fertiliser on a field; weeks later the fish in a nearby river die. Put the steps in order and explain. Rain washes **nitrate ions** off the field into the river. The extra nitrate makes algae grow very fast and cover the surface. The algae block the light, so the plants below die. **Decomposers** multiply as they feed on the dead algae and plants, and their **aerobic respiration** uses up the oxygen dissolved in the water. With too little oxygen left, the fish die. The fish are **not** poisoned by the fertiliser - they suffocate, and it is the decomposers that actually remove the oxygen.

■ Plastics and air pollution

Non-biodegradable plastics do not rot away. They build up in the sea and on land, harming wildlife – animals may eat them or get trapped.

Methane and carbon dioxide are greenhouse gases. Too much of them strengthens the **greenhouse effect** (the enhanced greenhouse effect), which causes **climate change**.



Greenhouse gases trap heat leaving the Earth, so the Earth gets warmer

Conservation

■ Sustainable resources

A **sustainable** resource is produced as fast as it is used up, so it never runs out. Forests and **fish** stocks can both be managed in this way.

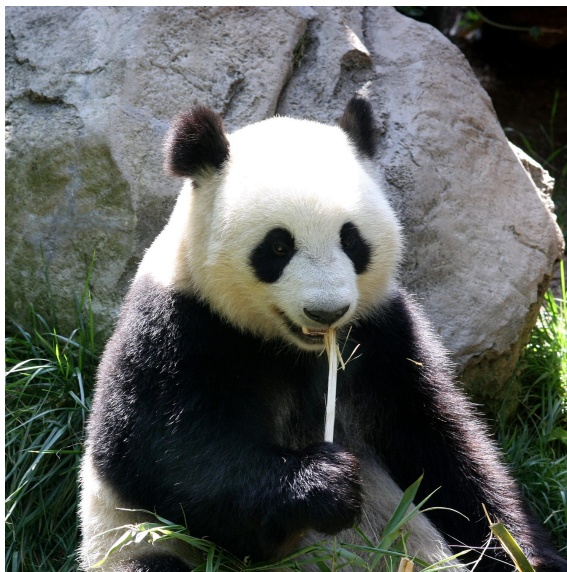
(Supplement) Forests are **conserved** by education, protected areas, **quotas** (limits on how much is taken) and replanting. Fish stocks are conserved by **closed seasons**, protected areas, controlled net mesh sizes (so young fish can escape), quotas and monitoring.

■ Saving endangered species

A species becomes **endangered** or extinct when its numbers fall, because of climate change, habitat destruction, **hunting**, **overharvesting**, pollution and **introduced species**.

Endangered species can be saved by:

- monitoring and protecting the species and its habitat.
- education.
- **captive breeding** programmes, which breed animals in zoos. (Supplement) These may use **artificial insemination** (AI) or **in vitro fertilisation** (IVF).
- **seed banks**, which store seeds safely.



The giant panda was once endangered; protected habitats and captive-breeding programmes have helped its numbers recover

(Supplement) We conserve nature to keep up biodiversity, reduce extinction, protect ecosystems, and keep ecosystem functions going – such as recycling nutrients and providing food, **drugs**, fuel and useful **genes**. If a population becomes

too small, it loses **genetic variation** , which makes it harder for the species to survive future change.

Exam tips

- More food: machinery, fertilisers, insecticides, herbicides, selective breeding. Monocultures and intensive farming each have advantages and disadvantages.
- Deforestation: less biodiversity, extinction, soil loss, flooding, more carbon dioxide.
- Eutrophication (Supplement): fertiliser → more producers → more decomposers → less dissolved oxygen → organisms die.
- Greenhouse gases (carbon dioxide, methane) → enhanced greenhouse effect → climate change.
- Conservation: sustainable use, protected areas, quotas, captive breeding and seed banks. Small populations lose genetic variation.